



The Early Years



John Holland, inventor of the first U.S. Navy submarine *Holland VI*, stands topside on his creation, commissioned *USS Holland* (SS-1) on October 12, 1900.

At the dawn of the new century, prominent American naval leaders recognized the submarine as a real threat to international surface forces and persuaded the Navy to acquire its first submarine in 1900. Inventors John Holland and Simon Lake competed their designs. Holland won the design competition and sold his newest model, *Holland VI*, to the Navy for \$150,000 on 11 April 1900. This 64-ton submarine, commissioned as *USS Holland* (later assigned the designation SS-1), was equipped with an Otto-type gasoline engine for surface running and electric motors for submerged operations. Due to the volatility of gasoline, American submersible designs soon followed the French practice and adopted the diesel engine in 1909.

Early submarine classes such as *E*, *H*, *K*, *L*, *M*, *N*, *O*, and *R*, known as "pig boats" or "boats" because of their unusual hull shape and foul living conditions, ranged in displacement from 287 to 510 tons. The fastest "boats" achieved top surface speeds of 14 knots under diesel power. During World War I, U.S. submarines were divided into two groups according to mission. Boats of the *N* and *O* classes, as well as some of the *E* type, patrolled American coasts and harbors in a defensive role. Other submarines patrolled hostile European waters after 1917. Some *K*, *L*, *O*, and *E* class boats conducted offensive, open-sea operations from the Azores and Bantry Bay in Ireland. They supported the Allied effort to maintain open sea lanes along the European coast and in the approaches to the British Isles.

The Navy Department's plans for future submarines reflected the prevailing surface warfare thinking of the time. The submersible was viewed as a type of destroyer or torpedo boat that should operate with the battle fleet. Consequently, the first submarine designed by the Bureau of Construction and Repair and the Bureau of Steam Engineering produced the faster 15-knot, 800-ton, *S* class submarine in 1916, built by the Electric Boat Company and Lake Torpedo Boat Company. At virtually the same time, Electric Boat received a commission to design the three boats of the 20-knot *T*, or AA class, with a normal displacement of 1,107 tons. On paper these characteristics, adopted during World War I, brought the U.S. Navy one step closer to the "fleet submarine," a submersible that could keep pace with surface ships of the battle fleet.





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General Characteristics, *Holland Class*

Builders: Crescent Shipyard, Elizabethport, NJ
Power Plant: Otto Gasoline Engine (surfaced) Electric batteries (submerged)
Length: 53.8 feet (16.4 meters)
Beam: 10.7 feet (3.3 meters)
Displacement: 64 tons surfaced, 74 tons submerged (65/75 metric tons)
Speed: 6 knots (11 kph)
Crew: 1 Officer, 6 Enlisted
Armament: One 18-inch (457 millimeters) torpedo tube, Three Whitehead torpedoes
Date Deployed: 12 October 1900 (*USS Holland*)

General Characteristics, *K Class*

Builders: Fore River Shipbuilding, Quincy, MA; Union Iron Works, San Francisco, CA; Seattle Construction and Drydock Company, WA
Power Plant: NELSECO/Busch-Sulzer Diesel (surfaced) Electric batteries (submerged)
Length: 153.6 feet (46.8 meters)
Beam: 16.7 feet (5.0 meters)
Displacement: 392 tons surfaced, 521 tons submerged (398/529 metric tons)
Speed: 14 knots (26 kph)
Crew: 2 Officers, 26 Enlisted
Armament: Four 18-inch (457 millimeters) torpedo tubes
Date Deployed: 31 January 1914 (*USS K-2 (Cachalot)*)

General Characteristics, *L Class*

Builders: Fore River Shipbuilding, Quincy, MA; Lake Torpedo Boat Company, Bridgeport, CT; Crescent Shipyard, Elizabethport, NJ; Portsmouth Naval Shipyard, NH
Power Plant: NELSECO/Busch-Sulzer Diesel (surfaced) Electric batteries (submerged)
Length: 168.5 feet (51.4 meters)
Beam: 17.3 feet (5.3 meters)
Displacement: 450 tons surfaced, 548 tons submerged (457/557 metric tons)
Speed: 14 knots (26 kph)
Crew: 2 Officers, 26 Enlisted
Armament: Four 18-inch (457 millimeters) torpedo tubes ; one 3-inch deck gun
Date Deployed: 11 April 1916 (*USS L-1*)

General Characteristics, *O Class*

Builders: Fore River Shipbuilding, Quincy, MA; Lake Torpedo Boat Company, Bridgeport, CT; Portsmouth Naval Shipyard, NH
Power Plant: NELSECO/Busch-Sulzer Diesel (surfaced) Electric batteries (submerged)
Length: 172 feet/175 feet (O-11 through O-16) (52/53 meters)
Beam: 18 feet/16.6 feet (5.5/5.0 meters)
Displacement: 520 tons/485 tons surfaced, 629 tons/566 tons submerged (528/493,639/575 metric tons)
Speed: 14 knots (26 kph)
Crew: 2 Officers, 27 Enlisted
Armament: Four 18-inch (457 millimeters) bow tubes; one 3-inch deck gun
Date Deployed: 28 May 1918 (*USS O-4*)

